

### **1. Sediment – Pond 1 and West Tributary**

RAO: Prevent human and ecological direct and ingestion exposures to the sediment with concentrations of contaminants of potential concern (COPCs) exceeding the lead preliminary remediation goal (PRGs) of 200 mg/kg.

RAO: Minimize migration of sediment COPCs into the ground water, surface water, and Sand Creek

Lead: 200mg/kg

Justification:

- Pond is adjacent to the lead additive area and received run-off containing concentrations of lead exceeding the ecological risk
- This tributary is routinely dry and is considered accessible as soil
- The pond and tributary discharge surface water and sediment containing concentrations of lead to Sand Creek.
- Calculated lead PRG for blood lead levels not exceeding 5% chance of 5ug/dL for residential child

### **2. Soil**

RAO: Prevent human and ecological direct and ingestions exposures to the soils with concentrations of contaminants of potential concern (COPCs) exceeding the 200 mg/kg, residential and the industrial lead PRG of 400 mg/kg.

RAO: Minimize migration of soil COPCs into the ground water, surface water, sediment, and other site soils.

Lead: 200mg/kg residential

Lead: 400 mg/kg industrial areas on Wilcox process area

Justification:

- Calculated lead PRG for blood lead levels not exceeding 5% chance of 5ug/dL for residential child
- Calculated lead PRG for blood lead levels not exceeding 5% chance of 5ug/dL for industrial worker: locations exceeding 400 and 500 mg/kg are identical. The 400mg/kg is the industrial PRG for not exceeding 5% chance of 5ug/dL blood lead and the PRG for residential blood lead levels not exceeding 5% chance of 10ug/dL blood lead.

#### Place holder for Benzo(a)pyrene pending additional review

RAO: Prevent human direct and ingestion exposures to the soil with concentrations of contaminants of potential concern (COPCs) exceeding the benzo(a)pyrene PRG of (.12 resident at 10-6 or 1.2 mg/kg resident at 10-5)

#### **Benzo(a)pyrene additional review.**

It is noted that the HHRA evaluated potential residential human health risks based on exposure to the entire exposure area within each of the 5 site operational areas. However, these exposure areas are larger than areas that are typically evaluated as a residential yard. To further evaluate the surface soil medium of concern and potential concerns related to smaller exposure areas (i.e., potential residential yards), sample results were reviewed to determine if areas of high concentration are present within the five site operational areas. Areas of high concentration were identified for benzo(a)pyrene; therefore, there is a potential that isolated areas may be a potential human health concern for residential receptors.

To evaluate this, these areas of high concentrations will be further delineated to represent typical residential lots and potential risks will be evaluated.

#### **Summary of Risk Findings**

##### Human Health

- The risk assessment determined that excess cancer risks associated with exposures to site media (except ground water) under any of the scenarios evaluated for any of the 5 site areas did not exceed the EPA acceptable cancer risk range ( $1 \times 10^{-6}$  to  $1 \times 10^{-4}$ ). Excess Cancer risks are within or less than the risk range and did not exceed  $1 \times 10^{-4}$ ; therefore, health concerns related to excess cancer risks are not expected and no remediation based on excess cancer risk exposures are proposed.
- The risk assessment determined that excess cancer risks associated with exposures to surface water and sediment did not exceed the EPA acceptable cancer risk range ( $1 \times 10^{-6}$  to  $1 \times 10^{-4}$ ) and that the noncarcinogenic hazards were below the level of concern ( $<1$ ). Excess Cancer risks are within or less than the risk range and did not exceed  $1 \times 10^{-4}$  while noncarcinogenic hazards were below the level of concern ( $<1$ ); therefore, no remediation based on excess cancer risk or non-cancer risk exposures are proposed.
- The risk assessment determined that excess cancer and non-cancer risks associated with exposures to ground water are present under the residential and industrial scenarios; therefore, remediation based on excess cancer risk or non-cancer risk exposures are proposed. [Pending technical memorandum review.]
- Lead concentrations in surface soil within the Lorraine Process Area and Wilcox Process Area revealed greater than 5% chance of the population (child resident) exceeding all reference blood-lead levels (5, 8 and 10) evaluated in the IEUBK. Remediation based on lead exposures is proposed for residential areas.
- The adult lead model indicated that the 5  $\mu\text{g}/\text{dL}$  reference blood-lead level had greater than 5% chance of the population (adults) exceeding in the Lorraine and Wilcox Process Areas. Remediation based on lead exposure is proposed for industrial areas.

- The risk assessment determined that non-cancer risks associated with exposures to soil through the ingestion of home produce and beef are present for all areas, and is primarily associated with the metals cobalt, iron, and copper. These metals are sporadically detected across the soil medium, are collocated within proposed remediation areas, and are less than background (cobalt and copper). There is a high degree of uncertainty in the models because these pathways model potential health impacts from surface soil concentrations rather than actual produce and/or beef concentrations. Due to uncertainties associated with uptake from soil and the conservative assumptions in the model, the results presented here are likely an overestimation of potential risk. None of these metals were identified as significant contributors to risk or as significant contributors based on target organs. As such, these metals are not considered COPCs, and no remediation based on these metals is proposed.

#### Ecological

- The risk assessment determined that potential risks associated with exposures to lead in site soil (all 5 areas) are present for plants, insectivorous mammals, insectivorous birds, and herbivorous birds. Areas of concern are collocated with human health remediation areas; therefore, remediation based on an ecological lead exposure PRG is not proposed for soil.
- The risk assessment determined that potential risks associated with exposures to vanadium in the site soil (all 5 areas) are present for plants and insectivorous birds. Areas of concern are collocated with human health remediation areas; therefore, remediation based on an ecological vanadium exposure PRG is not proposed for soil.
- Potential risks to aquatic organisms in the ponds (cadmium, lead, BaPyrene) and streams (manganese) from elevated concentrations of contaminants in the water column are likely to be reduced following removal of contaminated soil in the uplands. No remediation based on potential risks associated with surface water is proposed.
- Concentrations of Total PAHs in stream sediment, when compared to the probable effects level (PEL) of 16.8 mg/kg (MacDonald et al 1996) indicates no potential risk to benthic organisms from total PAHs in stream sediments; therefore, no remediation based on potential risks to benthic invertebrates from PAHs is proposed.
- Because of infrequent detections of volatile organic compounds, the volatile nature of the chemicals, the absence of direct toxicological studies, and the unsubstantiated theoretical nature of the soil screening values, it is not expected that these VOCs would result in unacceptable risk to populations of soil invertebrates; therefore, no remediation based on potential risks to soil invertebrates from VOCs is proposed.
- It is unlikely that there would be adverse impacts to the plant or soil invertebrate communities at the site from sporadic elevated concentrations of metals (zinc, manganese, copper, and chromium) based on the following, and as a result, no remediation based on potential risks to plants or soil invertebrates is proposed.
  - Low HQs identified in the SLERA, based solely on a screen against EcoSSLs or screening benchmarks from Efroymsen et al. (1997a,b).

- Low potential for uptake and toxicity from naturally occurring metals, many of which are essential nutrients.
- Sporadic elevated concentrations not linked to facility activities.
- Lack of sufficient ecological habitat from long-term and/or continued future industrial, residential, and agricultural usage of many portions of the site.
- Removal of select concentrations of metals during excavations for lead and/or benzo(a)pyrene, thus reducing the overall HQs.

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Application of the PRGs across the sites based on current land use and future expected land use.

Area	Current Use	Future Use	Proposed Use for FS and PRG application	Justification
North Tank Farm	Residential	Residential	Residential	No Further Action
	Commercial/Industrial	Commercial/Industrial	Residential Commercial/Industrial	No Further Action
East Tank Farm	Residential	Residential	Residential	Current and future use expected to remain unchanged; Lead PRG Residential
	Agricultural/Livestock	Residential/Agricultural/Livestock	Residential	Current and future use expected to remain unchanged; Lead PRG Residential
Lorraine Process Area	Residential	Residential	Residential	Current and future use expected to remain unchanged; Lead PRG Residential  Note: <ul style="list-style-type: none"> <li>Benzo(a)pyrene is currently under review.</li> <li>Ground water is currently under review, and may require ICs.)</li> </ul>
Wilcox Process Area	Residential	Residential/Commercial/Industrial	Residential/Commercial/Industrial	Current and future use expected to remain unchanged; Lead PRG residential portions and Lead PRG residential/Industrial portions Note: <ul style="list-style-type: none"> <li>Benzo(a)pyrene is currently under review.</li> <li>Ground water is currently under review, and may require ICs.)</li> </ul>
Loading Dock Area	Commercial/Industrial	Commercial/Industrial	Residential Commercial/Industrial	Note: <ul style="list-style-type: none"> <li>Benzo(a)pyrene is currently under review.</li> </ul>